37058

ADDENDUM TO THE SITE OPERATIONS PLAN
FOR
ADDITIONAL ENGINEERING STUDIES

NATIONAL GYPSUM COMPANY
MILLINGTON SITE

Prepared By:

HART ENGINEERS, INC.
Penn Center West III, Suite 106
Pittsburgh, Pennsylvania 15276

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1.0 INTRODUCTION

Fred C. Hart Associates, Inc. (HART) has been retained by National Gypsum Company of Dallas, Texas to conduct a Remedial Investigation/Feasibility Study at the Millington and Mill Satellite Sites in Passaic Township, New Jersey. This investigation is being implemented pursuant to CERCLA Administrative Order 50103 between National Gypsum Company and the United States Environmental Protection Agency (USEPA) under the National Superfund Program. Remedial Investigation (RI) activities have already been conducted at the Millington Site which contains an approximately twenty (20) foot high embankment primarily comprised of asbestos of fill, located near the western boundary of the property and adjacent to the Passaic River. As part of the RI study, a limited number of representative samples of asbestos were collected from the pile for subsequent engineering property testing. Results of the testing were used to conduct preliminary engineering analyses pertaining to the stability of the embankment. Based on the preliminary analyses, it was concluded that the embankment is marginally stable in its current condition and configuration, and that additional (more detailed) studies need to be conducted to confirm the results of the preliminary analyses. Accordingly, the purpose of this Work Plan is to present a more rigorous and detailed study for stability evaluation, which would include more detailed topographic mapping, additional field investigation and laboratory testing, and refined stability analyses based on the data gathered from the field investigation and laboratory testing programs. Subsequent sections of this Work Plan describe the previous engineering investigation, as well as present the proposed Scope of Work for additional investigations and analyses of the asbestos pile at the Millington Site.

2.0 SUMMARY OF PREVIOUS STUDY

HART conducted the field investigation of the Remedial Investigation (RI) phase of the project in the fall of 1986. A series of test borings were constructed along the top of the asbestos embankment at the Millington Site, to delineate subsurface conditions and to obtain relatively undisturbed asbestos and soil samples for characterization testing. Both split spoon and undisturbed "Shelby Tube" samples were collected from each of the borings. Upon test boring completion, monitoring wells were installed into the boreholes for subsequent water quality testing and groundwater depth measurements. A generalized cross section developed from the test borings is presented as Figure 1.

Inspection of the undisturbed samples indicated that seven (7) samples were suitable for testing; of the seven (7) samples, six (6) samples were representative of the asbestos and one (1) sample was representative of the underlying native soil. The laboratory testing program included determination of natural moisture contents, Atterberg Limits, dry unit weights, consolidation (native soil only) and consolidated-undrained shear strength. Results of the laboratory testing indicated that the properties of the asbestos are particularly different from those of the native soils. Moisture contents of the asbestos samples were higher (117% to 512%) than the soil sample (24%); correspondingly, the unit weights of the asbestos were lower (13.4 pcf to 38.1 pcf) than the native soil (102.4 pcf). In addition, the asbestos displayed relatively low strength ($C = 150$ psf, $\phi = 15^{o}$) in comparison to the on-site native material. A summary of the test results is included as Table 1.

Stability analyses were conducted for the asbestos embankment using the Modified Bishop method of slices with the STABL3 computer program. Input geometry was approximated with the stratigraphic sections developed from the field investigation; material properties were established from the results of the laboratory analyses. Results of the stability analyses indicated that the static factor of safety against slope failure was approximately 1.0, which is typical of soils or other materials that are freely dumped (uncompacted) and

TABLE 1

SUMMARY OF LABORATORY TEST RESULTS
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Boring and Sample No.	Depth (ft.)	Description	Natural Water Content (%)	ATTERBERG LIMITS Liquid Limit (%)	ATTERBERG LIMITS Plastic Limit (%)	Dry Unit Weight (pcf)	Consolidated Undrained Triaxial Test
B902 S3	2.5-4.5	Asbestos	321	NP	NP	16.3	
B902 S4	20.5-22.5	Asbestos	512	NP	NP	13.4	
B904 S1	4.5-6.5	Asbestos	338 285			14.5 17.6	
B904 S2	6.5-8.5	Asbestos	134 117			35.1 38.1	C = 150 psf. $\phi = 15^0$
B904 S3	11.0-13.0	Asbestos	336			16.1	
B904 S4	16.0-18.0	Asbestos	228			23.0	
B902 S7	29.5-31.5	Brown Silty Clay	24.4			102.4	

NOTE: NP designates "Non-Plastic" classification.

allowed to reach a natural static equilibrium. In addition, analyses which included potential earthquake effects indicated that the seismic factor of safety was less than 1.0, implying an unstable state under such conditions.

Although the results of the stability analyses imply that inadequate stability may exist within the asbestos embankment, these analyses were based upon limited field and laboratory data. It is common for fill materials placed in an "uncontrolled" manner to exhibit variability of physical and engineering properties with respect to depth, due to layering of materials with differing physical characteristics. In particular, variations in strength and density often occur in response to differing moisture contents, gradation, specific gravity, overburden pressure, etc. For this study, a comparison of depth to unit weight and natural moisture content was evaluated for asbestos samples obtained from Test Boring 904, as shown on Figure 2. It is apparent from this comparison that the physical properties of the asbestos at the Millington Site vary significantly with respect to depth. Accordingly, it is recommended that a more thorough sampling and laboratory testing program be implemented to determine more accurate and precise strength parameters for use in subsequent stability analyses. In addition, the effect of the existing vegetation on the embankment slope should also be considered in a more rigorous analysis. Section 3.0 of this Work Plan presents in detail the recommended Scope of Work to more thoroughly characterize the engineering properties of the asbestos, as well as to refine stability analyses and confirm the factor of safety against slope failure for the embankment.

3.0 TECHNICAL APPROACH

3.1 Additional Topographic Mapping

Since stability is highly sensitive to slope configuration, it will be necessary to refine the existing topographic map such that a two (2) foot contour interval can be provided on the face of the embankment slope. Additional topographic coverage between the toe of the slope and the Passaic River will also be required for subsequent analyses. To develop this additional topographic mapping, a ground survey will be implemented as the most timely approach to providing coverage for the relatively small area of concern. Cross-sections will be surveyed on a fifty (50) foot center-to-center spacing across the face of the slope, extending from the river shoreline to a point at least fifty (50) feet beyond the top of slope. The topographic map (dated 1/23/87) presented in the RI report will then be updated to include two (2) foot contour intervals over the surveyed areas and will tie the new contours into the contours already shown on the map. The additional topographic coverage will permit more accurate determination of critical slope areas, as well as locate vegetated areas and other points of concern.

3.2 Subsurface Investigation and Laboratory Analyses

Four (4) additional test borings will be conducted at the site, to further define near surface stratigraphy as well as to collect additional asbestos samples for subsequent laboratory testing. The proposed test boring locations are presented on Figure 3. All locations will be surveyed and ultimately shown on the map discussed in Section 3.1 of this Work Plan. Hollow stem augers will be used to advance the borings, with asbestos/soil samples collected using both split-spoon and Shelby Tube samplers. Initially, a split-spoon sample will be collected, and then the augers advanced to the bottom of the sampling interval. A Shelby Tube sample will then be collected from the in-situ material. This alternating sampling procedure will proceed from the ground surface to bedrock in each of the test borings.

In accordance with the Health and Safety Plan presented in the Site Operations Plan, all soil disturbance activities on the asbestos pile will be conducted in Level C protection. Level C protection will include tyvek coveralls with hoods, full-face respirators with organic vapor and high efficiency particulate adsorption filter, steel-toed safety boots/shoes, hard hat and protective gloves. As an extra precaution, asbestos fibers will be wetted down during test boring operations to minimize airborne asbestos emissions. In addition, the site safety officer will use a photoionization detector (PID) or flame ionization detector (FID) to monitor for total volatile organics while drilling test borings.

For the purposes of the engineering investigation, the Standard Penetration Test (SPT) will be performed on all split-spoon samples. The Standard Penetration Test requires a 140-pound drive hammer with a 30-inch fall. Blow counts for each six inches of penetration will be recorded on the boring log. A standard three-inch diameter 24-inch Shelby Tube will be used for all undisturbed sampling. Upon undisturbed sample collection, the ends of the tube will be filled with damp paper, capped, and waxed to minimize moisture loss prior to laboratory testing.

Laboratory testing of the split-spoon samples will include determination of natural moisture content. All Shelby Tube samples will be tested for natural moisture content and unit weight. In addition, representative asbestos samples will be chosen for triaxial strength testing. It is anticipated that at least two (2) series of Consolidated-Drained tests will be conducted to further assess the strength characteristics of the asbestos.

3.3 Site Survey

During the subsurface investigation, the entire slope face will be visually inspected to identify any areas of surficial sloughing or erosion. All such areas will be staked and surveyed, and the locations and approximate dimensions included on the topographic map. The

vegetative growth on the slope will also be inspected to develop an estimate of average tree density, diameter and type. Some limited manual excavation will also be conducted with a hand shovel to estimate vegetative root depth and soil cover thickness on the slope. Any excavation activity will require Level C protection.

3.4 Evaluation of Stability

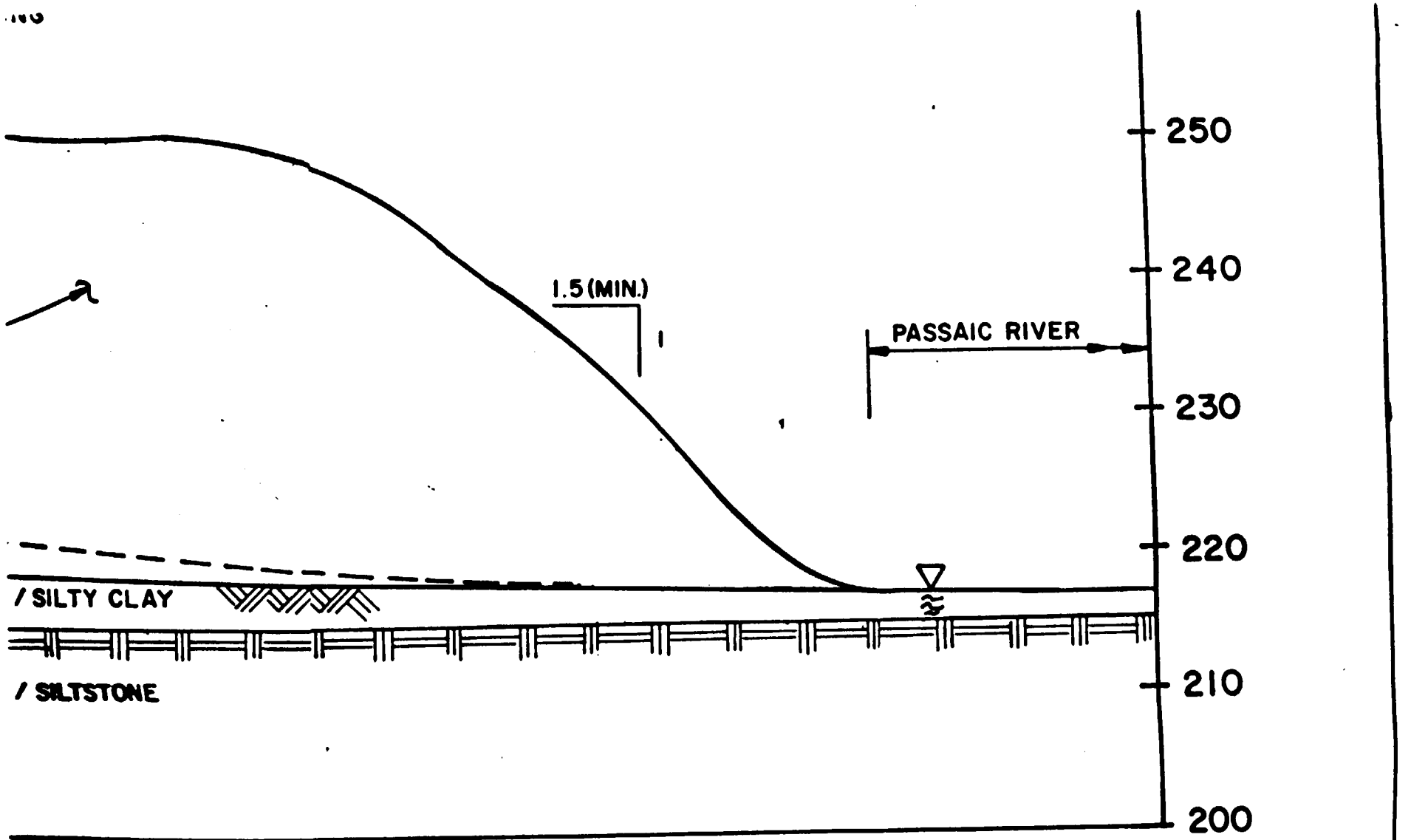
Ultimately, the results of the field investigation, site survey, and laboratory analyses will be utilized to conduct a thorough evaluation of both static and seismic stability conditions of the existing embankment. First, a paper study will be conducted to assess the influence of vegetation on the overall stability of the embankment. The study is intended to provide sufficient data to determine if the existing vegetation provides a significant increase in slope stability, which is typically not assessed in conventional stability analyses. Additional stability analyses will then be conducted using the STABL3 computer program, including adjustments for vegetative growth as appropriate. It is anticipated that the refined input geometry and data will provide a more accurate and precise evaluation of the overall slope stability.

3.5 Summary Report

Upon completion of all analyses, a Summary Report will be prepared to present results of the following:

- subsurface investigation;
- laboratory analyses;
- site survey; and,
- paper study on vegetation.

The report will then present the results of the stability analyses, and will assess the adequacy of the existing slope stability with recommendations for alternative remedial approaches (if necessary).



CAL SECTION THROUGH ASBESTOS EMBANKMENT

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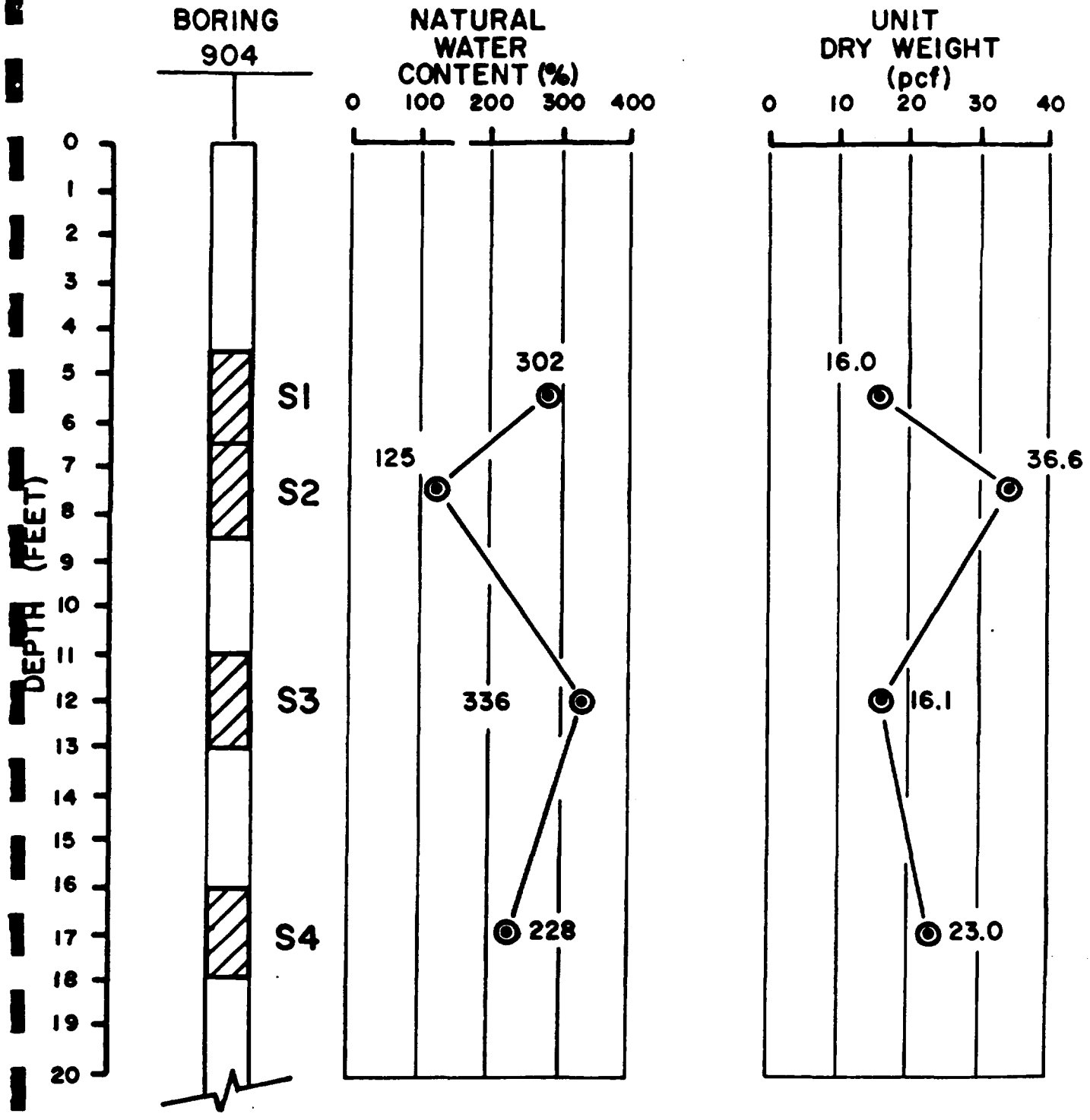
L SCALE

20 30 FEET

VERTICAL SCALE

0 10 20 30 FEET

FIGURE 1



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COMPARISON OF ENGINEERING PROPERTIES TO DEPTH IN ASBESTOS

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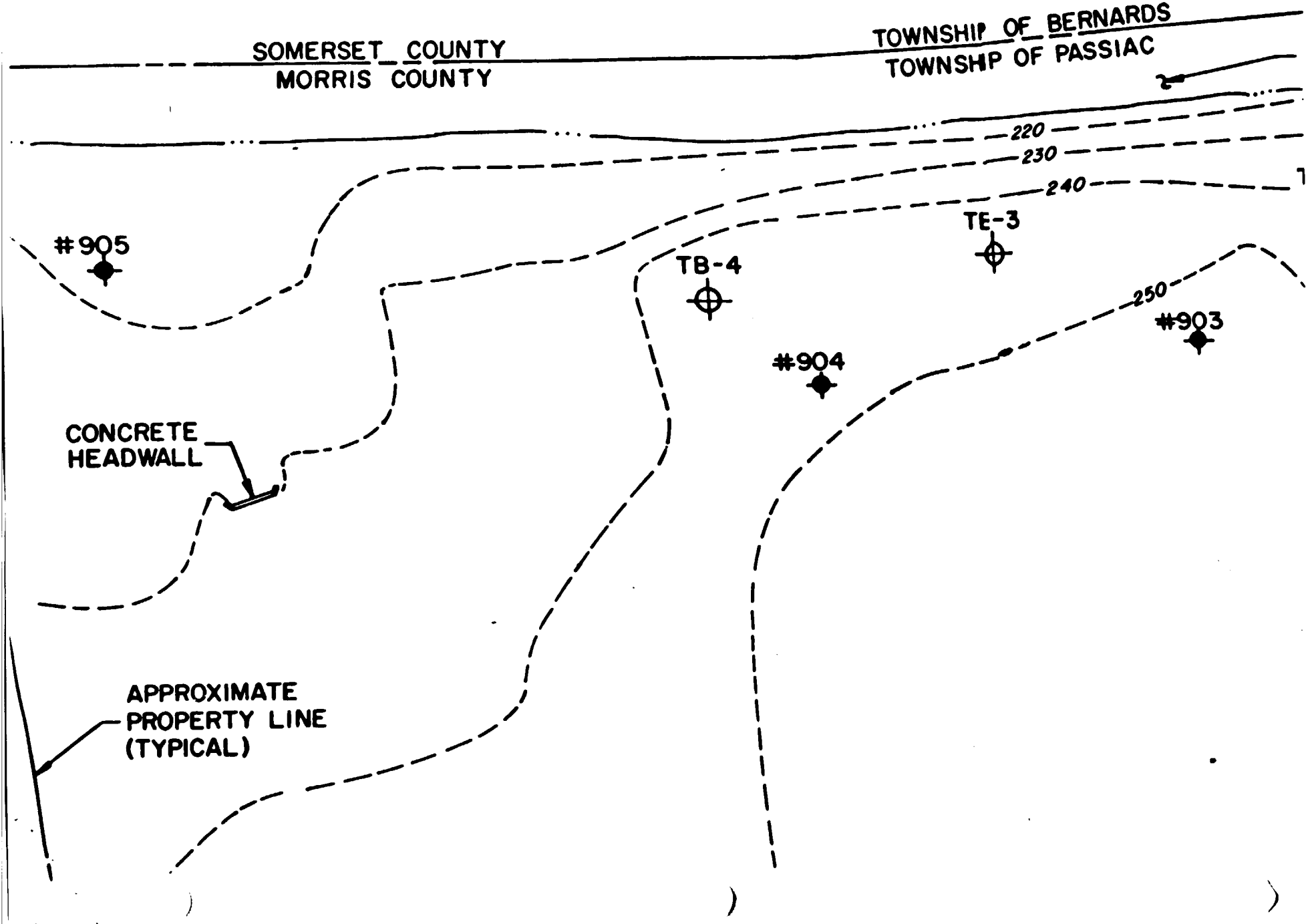
FIGURE 2


SOMERSET COUNTY
MORRIS COUNTY
TOWNSHIP OF BERNARDS
TOWNSHP OF PASSIAC
220
230
240
250
#905
TB-4
TE-3
#904
#903
CONCRETE HEADWALL
APPROXIMATE PROPERTY LINE (TYPICAL)